Claims

1. A polynucleotide vaccine comprising a polynucleotide sequence that encodes the HCV Core protein and a polynucleotide sequence that encodes at least one other HCV protein, wherein the vaccine causes expression of the proteins within the same cell and the sequence of the polynucleotide sequence encoding the core protein has been mutated or positioned relative to the polynucleotide sequence encoding the at least one other HCV protein such that the negative effect of expression of the Core protein upon the expression of the said at least one other HCV protein is reduced.

2. A polynucleotide vaccine as claimed in claim 1, wherein polynucleotide encodes a core protein that is truncated from the carboxy terminal end in a sufficient amount to reduce the inhibitory effect of Core upon the expression of other HCV proteins.

3. A polynucleotide vaccine as claimed in claim 2 wherein the polynucleotide encodes the mature form of HCV core protein after the second naturally occurring cleavage during normal HCV infection.

4. A polynucleotide vaccine as claimed in 2 wherein the truncated core protein has a deletion of at least the C-terminal 10 amino acids.

5. A polynucleotide vaccine as claimed in claim 2 wherein the truncated core protein consists of the Core 1-151 sequence.

6. A polynucleotide vaccine as claimed in claim 1, wherein the HCV proteins are encoded by the polynucleotide in more than one expression cassettes.

7. A polynucleotide vaccine as claimed in claim 6, wherein the expression cassette encoding the Core protein is in a cis location downstream of the expression cassette which encodes at least one of the other HCV proteins.

8. A polynucleotide vaccine as claimed in claim 7 wherein the expression cassette encoding the Core protein is downstream of an expression cassette that encodes the NS5B protein.

9. A polynucleotide vaccine as claimed in claim 1, wherein the at least one other HCV protein comprises the HCV proteins: NS3, NS4B and NS5B.

10. A polynucleotide vaccine as claimed in claim 9, wherein the polynucleotide encodes no other HCV protein.

11. A polynucleotide vaccine as claimed in any one of claims 1 to 10 wherein the DNA sequence is in the form of a plasmid.

12. A polynucleotide vaccine as claimed in any one of claims 1 to 11 wherein the polynucleotides are codon optimised for expression in mammalian cells.

13. A method of preventing or treating an HCV infection in a mammal comprising administering a vaccine as claimed in any one of claims 1 to 12 to a mammal.

14. A method of vaccination of an individual comprising taking a polynucleotide vaccine as claimed in any one of claims 1 to 12, coating the polynucleotide onto gold beads and delivering the gold beads into the skin.

15. Use of a polynucleotide vaccine as claimed in any one of claims 1 to 12 in the manufacture of a medicament for the treatment of HCV.